

MONTANA FISH, WILDLIFE AND PARKS FISHERIES DIVISION

Environmental Assessment of the Construction of a Fish Barrier and Removal of Non-Native Fishes with Electrofishing or Rotenone in Elkhorn Creek (Beartooth Wildlife Management Area)

PART I: PROPOSED ACTION DESCRIPTION

A. Type of Proposed Action: Native species restoration and protection

B. Agency Authority for the Proposed Action:

87-1-702. Powers of department relating to fish restoration and management. The department is hereby authorized to perform such acts as may be necessary to the establishment and conduct of fish restoration and management projects as defined and authorized by the act of congress, provided every project initiated under the provisions of the act shall be under the supervision of the department, and no laws or rules or regulations shall be passed, made, or established relating to said fish restoration and management projects except they be in conformity with the laws of the state of Montana or rules promulgated by the department, and the title to all lands acquired or projects created from lands purchased or acquired by deed or gift shall vest in, be, there remain in the state of Montana and shall be operated and maintained by it in accordance with the laws of the state of Montana. The department shall have no power to accept benefits unless the fish restoration and management projects created or established shall wholly and permanently belong to the state of Montana, except as hereinafter provided.

C. Estimated Commencement Date: June 2011

D. Name and Location of the Project: Environmental Assessment of the Construction of a Fish Barrier and Removal of Non-Native Fishes with Electrofishing or Rotenone in Elkhorn Creek

The project site is located in Lewis and Clark County approximately 14 miles from the town site of Wolf Creek, Montana; the downstream end of the project where a fish barrier is proposed is located at 46.9598°N, 111.7685°W. The North Fork of Elkhorn Creek terminates at 46.9571°N, 111.7553°W. The main fork of Elkhorn Creek terminates at 46.9148°N, 111.7218°W. Elkhorn Creek is located entirely on the Beartooth Wildlife Management Area managed by Montana Fish, Wildlife & Parks (Figure 1).

E. Project Size (acres affected)

1. Developed/residential – 0 acres
2. Industrial – 0 acres
3. Open space/Woodlands/Recreation – 0 acres
4. Wetlands/Riparian – The electrofished or piscicide treated length of Elkhorn Creek would be no more than 9 miles including tributaries. (Figure 1).

5. Floodplain – 0 acres
6. Irrigated Cropland – 0 acres
7. Dry Cropland – 0 acres
8. Forestry – 0 acres
9. Rangeland – 0 acres

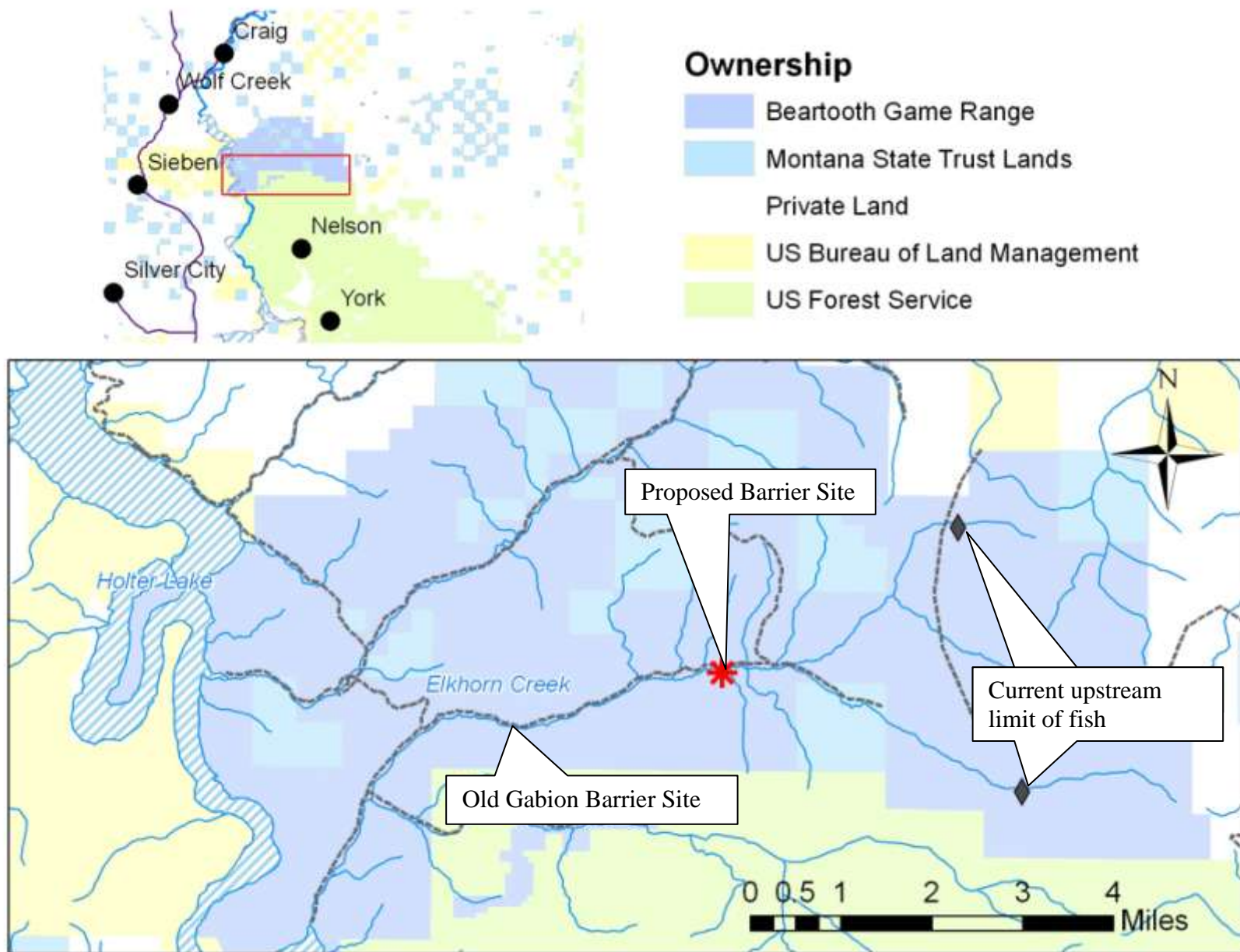


Figure 1. Map of the project area

F. Narrative Summary of the Proposed Action and Purpose of the Proposed Action

Non-hybridized westslope cutthroat trout (WCT) currently occupy less than 4% of historically occupied habitat in northcentral Montana (Moser et al. 2008). Primary threats to WCT include competition and hybridization with non-native rainbow trout (Leary et al. 1995; Hitt et al. 2003) and competition with brook trout (Dunham et al. 2002; Peterson et al 2004). Projects which restore WCT to historically occupied habitats are necessary to prevent extinction of WCT. In addition, efforts to stabilize and increase WCT populations would likely prevent a future listing of WCT under the Endangered Species Act.

In 1972, Montana Fish, Wildlife & Parks (MFWP) constructed a gabion fish barrier in the lower reaches of Elkhorn Creek (Figure 1). Rotenone was used to remove WCT hybridized with rainbow trout from approximately three miles of stream above the constructed barrier. The treated reach of stream naturally re-colonized from a source of non-hybridized WCT remaining in the headwaters of Elkhorn Creek. Genetic samples collected in 1996 indicated that the Elkhorn Creek population was still non-hybridized. In 2002, additional genetic samples indicated a recent hybridization event had occurred; likely because of a failure of the gabion fish barrier. A sample collected from the same area in 2008 revealed that the WCT population in Elkhorn Creek had become a hybrid swarm with some level hybridization in every individual. In addition, a single brook trout was captured upstream of the gabion fish barrier during genetic collections in early 2008. Site visits were made by restoration biologists and a design engineer to evaluate the potential for retrofit or rebuilding of the old gabion barrier. It was determined that site characteristics, primarily lack of incisement and beaver activity, would preclude this site from consideration for barrier repair/replacement. Moreover, it would be very difficult to effectively remove non-native fish from the first 3 miles of highly complex stream above the old gabion barrier. An alternate barrier site was identified approximately three miles upstream (Figure 1). The new barrier site features bedrock control points and a narrow incised channel. A barrier design and cost opinion was developed by EMC2 Engineering in 2008 (Funded by PPL Montana). The proposed action is to construct a barrier to non-native fishes and remove heavily hybridized WCT upstream of the barrier with electrofishing or piscicides. Genetic samples collected in 2009 from the headwaters of Elkhorn Creek revealed that WCT are less than 1% hybridized in the uppermost ½ to 1 mile of stream. These very slightly hybridized WCT would not be removed and would serve as the source of colonists for downstream treated reaches of Elkhorn Creek. If hybridization levels have increased to unacceptable levels since the last genetic testing (> 1%); then complete eradication of hybrids would be considered. In the event complete eradication is necessary, non-hybridized WCT (live fish or eyed-eggs) would be transferred from a separate drainage. All transfers would be completed under the scrutiny of the Montana Fish Health Laboratory and the MFWP Wild Fish Transfer Protocol. Elkhorn Creek below the new barrier would not be electrofished or treated and would be maintained as a hybridized population. Construction of the new fish barrier would likely occur in 2011.

The proposed removal of the majority of non-native fish in Elkhorn Creek and its tributaries upstream of a constructed concrete fish barrier would be accomplished using backpack electrofishing units first, if this fails, then removal would be accomplished with a rotenone based piscicide, CFT Legumine™ or equivalent (5% liquid rotenone). Construction of the fish barrier

would involve local dewatering, heavy equipment activity, and the pouring of a concrete structure similar to a weir at the site indicated in Figure 1. Elkhorn Creek downstream of the restoration area would be managed as a hybrid WCT fishery (though efforts to prevent upstream movement of brook trout past the gabion barrier would continue). It is predicted that a restored population of WCT in Elkhorn Creek would be very robust and resistant to extinction because of the large areal extent of the stream and the quality of the barrier site. Once the WCT population is restored; management alternatives which include limited harvest by anglers would be considered. Currently, general regulations in the Central Fishing District specify catch and release only for cutthroat trout in streams. This project would create an opportunity to angle for the only trout native to the Missouri River Drainage in a pristine stream with ample public access.

Montana Fish, Wildlife & Parks (MFWP) has a long history of using rotenone to manage fish populations in Montana that span as far back as 1948. MFWP has administered rotenone projects for a variety of reasons, but principally to improve angling quality or for native fish conservation. MFWP has a more recent history of removal projects using electrofishing. The success of electrofishing projects has been very dependent on the complexity of the waterway or waterbody, the species of fish involved, and the goals of the removal effort. Electrofishing has been used to remove unwanted fish from streams with some success in northcentral Montana (Big Coulee Creek, Middle Fork Little Belt Creek, and Cottonwood Creek; Moser 2008).

Fish barriers are a necessary part of any non-native fish removal projects. Fish barriers have been used to great success throughout Montana to restrict upstream movement of non-native fishes. Some examples in northcentral Montana include, Big Coulee Creek, Middle Fork Little Belt Creek, Jumping Creek, and Pilgrim Creek. The majority of the remaining few non-hybridized WCT populations in northcentral Montana are protected by either natural barriers or man-made barriers.

In this project, the primary goal is a nearly pure population of WCT (> 99% WCT alleles), electrofishing efforts may be sufficient to remove enough hybridized fish to meet project goals. However, the complexity of habitat in Elkhorn Creek may preclude electrofishing as an adequate tool for the proposed project. Moreover, if brook trout have passed into the proposed project area and/or hybridization of headwater areas has reached unacceptable levels, piscicide treatment would likely be the only method adequate to meet project goals.

For this analysis the majority of effects discussions will focus on piscicide treatment because it is necessarily more directly impactful to the environment. Initial removals would focus on electrofishing efforts; if these efforts fail, then piscicide treatments would be used to reach project objectives. Analysis in bold italics will refer to effects specific to electrofishing.

Rotenone is a naturally occurring substance derived from the roots of tropical plants in the bean family such as the jewel vine (*Derris* spp.) and lacepod (*Lonchocarpus* spp.) that are found in Australia, Oceania, southern Asia, and South America. Rotenone has been used by native people for centuries to capture fish for food in areas where these plants are naturally found. It has been used in fisheries management in North America since the 1930s. Rotenone has also been used as a natural insecticide for gardening and to control parasites such as lice on domestic livestock

(Ling 2002). Rotenone acts by inhibiting oxygen transfer at the cellular level. It is especially effective at low concentrations with fish because it is readily absorbed into the bloodstream through the thin cell layer of the gills. Mammals, birds and other non-gill breathing organisms do not have this rapid absorption route into the bloodstream, and thus can tolerate exposure to concentrations much higher than that used to kill fish.

The boundaries for the treatment would be from approximately one mile downstream of the North and Main Forks of Elkhorn Creek (barrier site; Figure 1) upstream both forks to a point where WCT populations have been genetically tested as only slightly hybridized (Figure 1). If genetic testing reveals that hybridization has reached unacceptable levels then the entire stream may be treated. The waters between upstream and downstream limits of the project would be electrofished multiple times or treated with CFT Legumine or equivalent (5% liquid rotenone) EPA approved rotenone product with toxicant effects limited to the stream length within these boundaries and a short mixing zone below the barrier site. On site assays using caged fish would determine the appropriate concentration and treatment times. The effective concentration is expected to be consistent with the label recommendations for concentrations for “normal pond use” (i.e. 0.5 to 1 part per million CFT Legumine or 0.025 to 0.050 ppm active rotenone) Streams similar to Elkhorn Creek where rotenone has recently been used to restore WCT required no more than 1 ppm CFT Legumine. Liquid rotenone would be applied to the stream at regularly spaced intervals based on the bioassays, and are expected to be no more frequent than 2 hour stream travel time. Rotenone would be applied through the use of drip stations. Each drip station dispenses a precise amount of diluted rotenone into the stream (based on measured stream discharge in cubic feet per second). The application period would also be determined by the bioassays, but would likely be no less than 4 hours. A mixture of powdered rotenone (Prentox 7% rotenone), sand, and gelatin may be applied on a very limited basis. A powdered rotenone mix would only be used in springs and seeps that have the potential to provide refugia for the target fish. When the treatment ends, fresh water from untreated areas upstream would begin to dilute the piscicide concentration and oxidation would continue to break down remaining rotenone in Elkhorn Creek.

During treatment, rotenone passing downstream of the lower bounds of the treatment area would be detoxified with the addition of potassium permanganate to the stream. According to the CFT Legumine label, potassium permanganate should be applied to water at the appropriate concentration to compensate for organic demand of the stream and/or lake bottom so that enough remains to neutralize the rotenone. The discharge of the stream would be measured prior to treatment and the potassium permanganate would be applied at the rate specified on the CFT Legumine label. In addition, on-site assays would be conducted in this stream prior to the treatment to determine the appropriate amount of permanganate necessary to neutralize the rotenone. Potassium permanganate requires 15 to 30 minutes of contact time (approximately 0.25 miles in streams similar to Elkhorn Creek) to fully detoxify the rotenone. Caged fish would be used to measure the toxicity of the water in Elkhorn Creek to ensure the objectives have been met. After the application, we would use caged fish to evaluate when the waters are no longer toxic to fish and when fish can be restocked. The CFT Legumine label specifies that once caged fish show no signs of distress within 4 hours, the stream water is considered no longer toxic, and detoxification can be discontinued.

Previous treatments have shown that fish rapidly decay and are difficult to find even after a few days post treatment. However, accumulations of dead fish would be collected and buried on site. *Fish removed using electrofishing equipment would be disposed of similarly.*

Electrofishing efforts would likely require one to two passes twice a year for several years post barrier construction. If brook trout were encountered in any electrofishing pass, piscicide use may be necessary. The initial objective of the project is not complete removal of all hybridized fish in Elkhorn Creek; if piscicides are deemed necessary because of new sampling information, then only one piscicide treatment should be required in the absence of brook trout. If brook trout have invaded the proposed project area and are not completely eliminated with the first piscicide treatment, then additional treatments may be necessary. Elkhorn Creek would naturally recolonize from upstream areas after treatment. If hybridization levels in headwater areas have increased above 1% since previous sampling efforts in 2009, then complete eradication and transfer of WCT from separate drainages may be necessary.

PART II. ENVIRONMENTAL REVIEW

A. PHYSICAL ENVIRONMENT

1. <u>LAND RESOURCES</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Soil instability or changes in geologic substructure?			X		Yes	1a
b. Disruption, displacement, erosion, compaction, moisture loss, or over-covering of soil which would reduce productivity or fertility?			X		Yes	1b
c. Destruction, covering or modification of any unique geologic or physical features?		X				
d. Changes in siltation, deposition or erosion patterns that may modify the channel of a river or stream or the bed or shore of a lake?			X		Yes	1d
e. Exposure of people or property to earthquakes, landslides, ground failure, or other natural hazard?		X				

Comment 1a, 1b, 1d: If the proposed action is implemented, a fish barrier would be constructed at the downstream end of the restoration area. Wildlife managers of the Beartooth Wildlife Management Area would be consulted prior to any construction activity. Construction periods would be scheduled to be least impactful to wildlife movement and reproduction. Construction activities would be localized around the immediate barrier construction area. Heavy equipment necessary for construction would access the proposed barrier site along the road that parallels Elkhorn Creek. All permits necessary to work in and around Elkhorn Creek would be obtained,

including: Montana Stream Protection Act (SPA 124), Short-Term Water Quality Standard for Turbidity (318 Authorization), and Federal Clean Water Act (404) permits. Construction Best Management Practices (BMPs) to reduce erosion and sedimentation would be used and would include but may not be limited to the following measures:

- Temporary diversions for storm runoff of Elkhorn Creek flows would be constructed as specified and as needed to direct flows around the work area. Diversions would be designed, implemented, and maintained by the contractor in accordance with BMPs to control erosion and sediment release into Elkhorn Creek. BMPs may include, but are not limited to, temporary berms, cofferdams, sediment basins, ditches, silt fencing, straw bales, straw mulch, and erosion control matting.
- The contractor would plan and execute work to control and minimize surface runoff from cuts, fills, and other disturbed areas. The contractor would prevent sediment and/or sediment laden water from entering Elkhorn Creek to the extent practicable.
- All dewatering flows collected from open sumps or trenches or excavations would be routed through sediment retention structures prior to discharge to Elkhorn Creek.
- BMP measures would be installed along the margin of Elkhorn Creek prior to any earthwork which could release sediment to Elkhorn Creek. The BMPs would remain until vegetation is established. Disturbed areas would be mulched and seeded with a native plant mixture

Cumulative Impacts: Impacts from construction of a fish barrier would be limited to the construction period and a short recovery period afterward. Construction would occur during baseflow. The barrier would trap some fine sediment and bedload after construction; once the barrier naturally backfills (one to two years), sediment and bedload would pass downstream naturally. We do not expect the barrier to require maintenance or for the barrier to create other/future unforeseen impacts to land resources. A separate barrier project was constructed in Cottonwood Creek – an adjacent drainage - in 2010. Cottonwood Creek is approximately 6 road miles from the proposed project. Contractors would be required to restore any roads or infrastructure to a pre-project state. No long term cumulative impacts are expected from implementation of Cottonwood and Elkhorn creek projects.

2. <u>WATER</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Discharge into surface water or any alteration of surface water quality including but not limited to temperature, dissolved oxygen or turbidity?			X		Yes	2a
b. Changes in drainage patterns or the rate and amount of surface runoff?		X				
c. Alteration of the course or magnitude of		X				2c

flood water or other flows?						
d. Changes in the amount of surface water in any water body or creation of a new water body?		X				
e. Exposure of people or property to water related hazards such as flooding?		X				
f. Changes in the quality of groundwater?		X				2f
g. Changes in the quantity of groundwater?		X				
h. Increase in risk of contamination of surface or groundwater?			X		Yes	See 2f
i. Effects on any existing water right or reservation?		X				See 2c
j. Effects on other water users as a result of any alteration in surface or groundwater quality?		X				2j
k. Effects on other users as a result of any alteration in surface or groundwater quantity?		X				See 2c
l. Will the project affect a designated floodplain?		X				
m. Will the project result in any discharge that will affect federal or state water quality regulations? (Also see 2a)			X		Yes	2m

Comment 2a: The proposed project is designed to intentionally introduce a pesticide to surface water to remove unwanted fish. The impacts would be short term and minor. Prentox (7% powder) and CFT Legumine rotenone are EPA registered pesticides and are safe to use for removal of unwanted fish. The concentration of CFT Legumine (5% liquid) proposed is 0.5 to 1 part per million, but could be adjusted within the label allowed limits based upon the results of on-site assays. Prentox (7% powder) may be used in a sand and gelatin mix to treat springs and seeps within the treatment area. An equivalent EPA approved rotenone product may be used if CFT Legumine is unavailable at the time of treatment. ***There would be no impacts to water quality from electrofishing treatments.***

There are three ways in which rotenone can be detoxified once applied. The most common method is to allow natural breakdown to occur. Rotenone is a compound that is susceptible to natural breakdown (detoxification) through a variety of mechanisms such as water chemistry, water temperature, exposure to organic substances, exposure to air, and sunlight intensity (Ware 2002; ODFW 2002; Loeb and Engstrom-Heg 1970; Engstrom-Heg 1972; Gilderhus et al. 1986). Rotenone persistence studies by Gilderhus et al. (1986) and Dawson et al. (1991) found that in cool water temperatures of 32 to 46°F the half-life ranged from 3.5 to 5.2 days. Gilderhus et al. (1986) reported that 30% mortality was experienced in rainbow trout exposed to degrading concentrations of actual rotenone (0.004 ppm) in 46°F pond water 14 days after a treatment. By day 18 the concentrations were sub-lethal to trout. The second method for detoxification involves basic dilution by fresh water. This may be accomplished by fresh ground water or surface water

flowing into a lake or stream. The final method of detoxification involves the application of an oxidizing agent like potassium permanganate at the downstream end of the treatment. This dry crystalline substance is mixed with stream or lake water to produce a concentration of liquid sufficient to detoxify the rotenone. Detoxification is accomplished after about 15-30 minutes of exposure time between the two compounds (Prentiss Inc. 2007). We would expect the treated stream above the barrier to naturally detoxify within 48 hours of the treatment. The treated stream would rapidly detoxify through addition of fresh water from untreated upstream sources and through the aforementioned physical and chemical breakdown processes. Inert ingredients (e.g. carriers) in CFT Legumine volatilize rapidly in the environment by both photolysis and hydrolysis and therefore do not pose a threat to the environment at the levels proposed for fish eradication.

Comment 2c: A barrier to upstream movement of non-native fishes would be constructed prior to piscicide treatment. The gradient of the stream at the proposed barrier location is high enough to prevent a significant impoundment of water. Loss of water to evaporation because of the barrier would be negligible and would not affect downstream water users. The barrier is designed to provide passage of flood flows estimated to have a recurrence interval of 100 years.

Comment 2f: No contamination of groundwater is anticipated to result from this project. Rotenone binds readily to sediments, and is broken down by soil and in water (Skaar 2001; Engstrom-Heg 1971, 1976; Ware 2002). Rotenone moves only one inch in most soil types; the only exception would be sandy soils where movement is about three inches (Hisata 2002). In California, studies where wells were placed in aquifers adjacent to and downstream of rotenone applications have never detected rotenone, rotenolone, or any of the other organic compounds in the formulated products (CDFG 1994). Case studies in Montana have concluded that rotenone movement through groundwater does not occur. For example, at Tetrault Lake, Montana neither rotenone nor inert ingredients were detected in a nearby domestic well, which was sampled two and four weeks after applying 90 ppb rotenone to the lake. This well was chosen because it was down gradient from the lake and also drew water from the same aquifer that fed and drained the lake. In 1998, a Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well, located 65 feet from the pond, was analyzed and no sign of rotenone was detected. In 2001, another Kalispell-area pond was treated with Prenfish 5% rotenone. Water from a well located 200 feet from that pond was tested four times over a 21 day period and showed no sign of contamination. In 2005, MFWP treated a small pond near Thompson Falls with Prenfish to remove pumpkinseeds and bass. A well, located 30 yards from the pond, was tested and neither Prenfish nor inert ingredients were found in the well (Don Skaar, *personal communications*).

Comment 2j: The CFT Legumine label states “...Do not use water treated with rotenone to irrigate crops or release within 1/2 mile upstream of a potable water or irrigation water intake in a standing body of water such as a lake, pond or reservoir...” There are no irrigation or potable water intakes within 1/2 mile of the proposed treatment area. Recreationists may use water from Elkhorn Creek for their pets and horses, and for themselves after filtering, but the treatment zone would be thoroughly posted to caution against use of the water while rotenone is being applied and thereafter for a precautionary period, about 4-5 days total.

Comment 2m: MFWP would apply for an exemption of surface water quality standards for the purpose of applying a pesticide from Montana DEQ under section 308 of the Montana Water Quality Act. MFWP would also apply for 318 Authorization for a Short-Term Water Quality Standard for Turbidity from Montana DEQ and a 404 Permit from the US Army Corps of Engineers to comply with the Federal Clean Water Act if the proposed action of barrier construction is implemented

Cumulative Impacts: The proposed action of piscicide treatment and the connected action of barrier construction would have a short term impact on water quality (piscicides and increased turbidity, respectively) and potentially a longer term impact on invertebrate species community composition of primary and secondary producers (algae and invertebrates) in Elkhorn Creek. These impacts would attenuate through time and would not impact the productivity of fisheries resources after restocking. We do not expect the proposed action to result in other actions that would create cumulative impacts to water resources in Elkhorn Creek. Nor do we foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to water resources related to construction of the barrier and treatment of Elkhorn Creek with piscicides.

3. <u>AIR</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Emission of air pollutants or deterioration of ambient air quality? (also see 13 (c))			X			3a
b. Creation of objectionable odors?			X		Yes	3b
c. Alteration of air movement, moisture, or temperature patterns or any change in climate, either locally or regionally?		X				
d. Adverse effects on vegetation, including crops, due to increased emissions of pollutants?		X				
e. Will the project result in any discharge which will conflict with federal or state air quality regs?		X				

Comment 3a: A gasoline generator would be used to run a power auger at the lower end of the treatment area to dispense powdered potassium permanganate (detoxifying agent). The generator would produce some exhaust fumes that would dissipate rapidly. During construction of the barrier, the use of heavy equipment and generators would impact air quality in the vicinity of the construction project. These impacts would be limited to the periods of construction and the immediate construction area.

Comment 3b: CFT Legumine does not contain the same level of aromatic petroleum solvents (toluene, xylene, benzene and naphthalene) of other rotenone formulations (i.e. Prenfish) and as

a consequence does not have the same odor concerns and has less inhalation risks. If Prenfish were to be used, objectionable odors from aromatic petroleum solvents would dissipate rapidly and would only be noticeable to workers carrying out the treatment.

Previous treatments have shown fish decay rapidly and are difficult to find even after a few days post treatment. However, any accumulations of noxious smelling dead fish would be collected and buried on site.

Cumulative Impacts: Impacts to air quality from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to air quality in Elkhorn Creek. Nor do we foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to air quality related to construction of the barrier and treatment of Elkhorn Creek with piscicides.

4. <u>VEGETATION</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Changes in the diversity, productivity or abundance of plant species (including trees, shrubs, grass, crops, and aquatic plants)?			X			4a
b. Alteration of a plant community?		X				
c. Adverse effects on any unique, rare, threatened, or endangered species?		X				
d. Reduction in acreage or productivity of any agricultural land?		X				
e. Establishment or spread of noxious weeds?			X			4e
f. Will the project affect wetlands, or prime and unique farmland?		X				

Comment 4a: During piscicide treatment, workers would access drip stations from the road that parallels Elkhorn Creek, by overland hiking, and by trail. There would be some trampling of vegetation along the stream during the placement and monitoring of drip stations and sentinel fish locations. Rotenone does not have an effect on plants at concentrations used to kill fish. Impacts from trampling vegetation are expected to be short term and minor. During barrier construction there would be a localized impact to vegetation at the proposed barrier site (see Comment 1). Heavy equipment necessary for construction would access the proposed barrier site along a road that parallels Elkhorn Creek (Figure 1).

Comment 4e: Temporary and localized disturbance to the ground during construction may create an environment conducive to noxious weed recruitment and growth. In addition, machinery and equipment used during the project may inadvertently carry noxious weeds to the project site. Proposed mitigation includes: 1) Washing all equipment and vehicles before entry

onto Beartooth Wildlife Management Area; removal of mud, dirt, and plant parts from project equipment before moving into project area; 2) inspection of the project area for noxious weeds annually for three years after the project is completed. If noxious weeds are found in the project area after project completion, herbicidal, manual or biological removal of weeds, including bagging and appropriate disposal would be implemented. Inspections and weed removal would continue in perpetuity during regular site visits by project fishery workers.

Cumulative Impacts: Impacts to vegetation from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to vegetation in Elkhorn Creek. We predict that the new less hybridized WCT fishery would not increase public use from present levels. A separate barrier project on Cottonwood Creek approximately 6 road miles from the proposed project was constructed in 2010. Some access roads on the Beartooth Wildlife Management Area are shared between these projects. Requirements for road maintenance would be similar for both projects. Contractors would be required to follow BMP's for weed prevention and weed removal for both projects. Thus, no long term cumulative impacts are expected from implementation of both these projects.

5. <u>FISH/WILDLIFE</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Deterioration of critical fish or wildlife habitat?		X				
b. Changes in the diversity or abundance of game animals or bird species?			X		Yes	5b
c. Changes in the diversity or abundance of nongame species?			X		Yes	5c
d. Introduction of new species into an area?		X				
e. Creation of a barrier to the migration or movement of animals?		X				
f. Adverse effects on any unique, rare, threatened, or endangered species?	X					5f
g. Increase in conditions that stress wildlife populations or limit abundance (including harassment, legal or illegal harvest or other human activity)?		X				5g
h. Will the project be performed in any area in which T&E species are present, and will the project affect any T&E species or their habitat? (Also see 5f)		X				
i. Will the project introduce or export any species not presently or historically occurring in the receiving location? (Also see 5d)		X				

Comment 5b: This project is designed to kill unwanted non-native fish. Historically, Elkhorn Creek would have supported westslope cutthroat trout in approximately 14 miles of stream. Approximately 12 miles of Elkhorn Creek supported non-hybridized WCT from 1972 to 1996 (after barrier construction and restoration in 1972). Currently, WCT in Elkhorn Creek near the proposed barrier site are highly hybridized (> 10 % rainbow). The abundance of fish in Elkhorn Creek should reach pre-project levels after five years. Diversity of fish in Elkhorn Creek will also be unchanged. This project will prevent further hybridization from occurring in upper Elkhorn Creek; thus protecting potentially rare and localized adaptations to habitat in Elkhorn Creek.

Comment 5c:

Aquatic Invertebrates:

In general, most studies report that aquatic invertebrates, excepting zooplankton are much less sensitive to rotenone treatment than fish (Schnick 1974). One study reported that no significant reduction in aquatic invertebrates was observed due to the effects of rotenone, which was applied at levels twice as high as the levels proposed for this project (Houf and Campbell 1977). In all cases, the reduction of aquatic invertebrates was temporary, and most treatments used a higher concentration of rotenone than proposed for this project (Schnick 1974). In a study on the relative tolerance of different aquatic invertebrates to rotenone, Engstrom-Heg et al. (1978) reported that the long-term impacts of rotenone are mitigated because those insects that were most sensitive to rotenone also tended to have the highest rates of recolonization. Because of their short life cycles (Anderson and Wallace 1984), good dispersal ability (Pennack 1989), and generally high reproductive potential (Anderson and Wallace 1984), aquatic invertebrates are capable of rapid recovery from disturbance (Boulton et al. 1992; Matthaei et al. 1996). In northcentral Montana, aquatic invertebrates are routinely collected prior to transfers of WCT to fishless habitats (Petty Creek, N. Fk. Ford Creek, Lonesome Creek, etc.). Most invertebrates collected prior to transfers were commonly found throughout Montana and in no cases were rare or endangered species of invertebrates discovered (Daniel Gustafson *personal communication*). These collections, in high elevation, remote stream reaches, indicate that the probability of eliminating a rare or endangered species in Elkhorn Creek is unlikely. Headwater reaches of Elkhorn Creek that do not hold fish would not be treated with fish piscicides and would provide a source of aquatic invertebrate colonists. In addition, recolonization would include aerially dispersing invertebrates from downstream areas of Elkhorn Creek (e.g. mayflies, caddisflies). The relatively small size of the treatment (9 miles of stream) and the proximity of source areas should aid in rapid recovery of the Elkhorn Creek aquatic community. The aquatic invertebrate community structure in Elkhorn Creek may be temporarily affected by the treatment (i.e. ratio of gilled to non-gilled invertebrates). Natural caused (e.g. fire) and anthropogenic (e.g. livestock grazing) disturbances also impact the structure of aquatic invertebrate communities (Wohl and Carline 1996; Mihuc and Minshall. 1995; Minshall 2003). Moreover, fire caused changes in trophic dominance may last greater than 15 years because of post fire changes to stream geomorphology and riparian species composition (Minshall 2003). Treatment with piscicides temporarily changes the ratio of certain invertebrate species; this is most likely less impactful than long term physical changes to the stream/riparian interface. Impacts to the stream channel

and the benthic community from barrier construction would be localized and minor.

Electrofishing impacts to aquatic invertebrates would be negligible.

Mammals, Birds, and Amphibians:

Mammals are generally not affected because they neutralize rotenone by enzymatic action in their stomach and intestines (AFS 2002). Laboratory tests by Marking (1988) involved feeding a form of rotenone to rats and dogs as part of their diet for periods of six months to two years and observing effects such as diarrhea, decreased food consumption, and weight loss. He reported that despite unusually high treatment concentrations of rotenone in rats and dogs, it did not cause tumors or reproductive problems in mammals. Studies of risk for terrestrial animals found that a 22 pound dog would have to drink 7,915 gallons of treated lake water within 24 hours, or eat 660,000 pounds of rotenone-killed fish, to receive a lethal dose (CDFG 1994). The State of Washington reported that a half pound mammal would need to consume 12.5 mg of pure rotenone to receive a lethal dose (Bradbury 1986). Considering the only conceivable way an animal can consume the compound under field conditions is by drinking lake or stream water, a half pound animal would need to drink 33 gallons of water treated at 2 ppm.

The EPA (2007) made the following conclusion for small mammals and large mammals;

*When estimating daily food intake, an intermediate-sized 350 g mammal will consume about 18.8 g of food. Using data previously cited from the common carp with a body weight of 88 grams, a small mammal would only consume 21% (18.8/88) of the total carp body mass. According to the data for common carp, total body residues of rotenone in carp amounted to 1.08 µg/g. A 350-g mammal consuming 18.8 grams represents an equivalent dose of 20.3 µg of rotenone; this value is well below the median lethal dose of rotenone (39.5 mg/kg * 0.350 kg = 13.8 mg = 13,800 µg) for similarly sized mammals. When assessing a large mammal, 1000 g is considered to be a default body weight. A 1000 g mammal will consume about 34 g of food. If the animal fed exclusively on carp killed by rotenone, the equivalent dose would be 34 g * 1.08 µg/g or 37 µg of rotenone. This value is below the estimated median lethal equivalent concentration adjusted for body weight (30.4 mg/kg * 1 kg = 30.4 mg = 30,400 µg). Although fish are often collected and buried to the extent possible following a rotenone treatment, even if fish were available for consumption by mammals scavenging along the shoreline for dead or dying fish, it is unlikely that piscivorous mammals will consume enough fish to result in observable acute toxicity.*

One study, in which rats were injected with rotenone for a period of weeks, reported finding lesions characteristic of Parkinson's disease (Betarbet et al. 2000). However, the results have been challenged on the basis of methodology: (1) that the continuous intravenous injection method used leads to "continuously high levels of the compound in the blood," and (2) second, that dimethyl sulfoxide (DMSO) was used to enhance tissue penetration (normal routes of exposure actually slow introduction of chemicals into the bloodstream). Finally, injecting rotenone into the body is not a normal way of assimilating the compound. Similar studies (Marking 1988) have found no Parkinson-like results. Extensive research has demonstrated that

rotenone does not cause birth defects (HRI 1982), gene mutations (Van Geothem et al. 1981; BRL 1982) or cancer (Marking 1988). Rotenone was found to have no direct role in fetal development of rats that were fed excruciatingly high concentrations of rotenone. Spencer and Sing (1982) reported that rats that were fed diets laced with 10-1000 ppm rotenone over a 10 day period did not suffer any reproductive dysfunction. Typical concentrations of actual rotenone used in fishery management range from 0.025 to 0.50 ppm and are far below that administered during most toxicology studies.

Similar results determined that birds required levels of rotenone at least 1,000 to 10,000-times greater than is required for lethality in fish (Skaar 2001). Cutkomp (1943) reported that chickens, pheasants and other members of lower orders of *Galliformes* were quite resistant to rotenone, and four day old chicks were more resistant than adults. Ware (2002) reports that swine are uniquely sensitive to rotenone and it is slightly toxic to wildfowl, but to kill Japanese quail required 4,500 to 7,000 times more than is used to kill fish.

The EPA (2007) made the following conclusion for birds;

*Since rotenone is applied directly to water, there is little likelihood that terrestrial forage items for birds will contain rotenone residues from this use. While it is possible that some piscivorous birds may feed opportunistically on dead or dying fish located on the surface of treated waters, protocols for piscicidal use typically recommend that dead fish be collected and buried, rendering the fish less available for consumption (see Section IV). In addition, many of the dead fish will sink and not be available for consumption by birds. However, whole body residues in fish killed with rotenone ranged from 0.22 µg/g in yellow perch (*Perca flavescens*) to 1.08 µg/g in common carp (*Cyprinus carpio*) (Jarvinen and Ankley 1998). For a 68 g yellow perch and an 88 g carp, this represents totals of 15 µg and 95 µg rotenone per fish, respectively. Based on the avian subacute dietary LC_{50} of 4110 mg/kg, a 1000-g bird would have to consume 274,000 perch or 43,000 small carp. Thus, it is unlikely that piscivorous birds will consume enough fish to result in a lethal dose.*

Also, if temporary reductions in aquatic invertebrates occur, insectivorous species such as American dippers may be impacted to the extent that they rely on aquatic invertebrates for food. Aquatic invertebrate communities typically recover rapidly from disturbance and impacted birds and mammals are mobile and would likely emigrate to nearby habitats until full recovery of the aquatic community.

Chandler and Marking (1982) found that clams and snails were between 50 and 150 times more tolerant than fish to Noxfish (5% rotenone formulation), and southern leopard frog tadpoles were between 3 and 10 times more tolerant than fish. Grisak et al. (2007) conducted laboratory studies on long toed salamanders, Rocky Mountain tailed frogs, and Columbia spotted frogs and concluded that the adults of these species would not suffer an acute response to Prenfish at trout killing concentrations (0.5-1 mg/L) but the larvae would likely be affected. These authors recommended implementing rotenone treatments at times when the larvae are not present, such as the fall, to reduce the chance of exposure to rotenone treated water and potential impacts to larval amphibians.

It is important to note that many toxicity studies involve subjecting laboratory specimens to unusually high concentrations of rotenone, or conducting tests on animals that would not normally be exposed to rotenone during use in fisheries management. Based on this information we would expect the impacts to non-target organisms to range from non-existent to short term and minor. ***Electrofishing impacts to amphibians would be negligible.***

Comment 5f: The proposed project area is within the range of Northern leopard frogs (*Rana pipiens*) (sensitive species), chorus frogs (*Pseudacris maculata*), Columbia spotted frogs (*Rana luteiventris*), and western toads (*Bufo boreas*). All of the amphibian species that could be present in the project area prefer to breed in the standing water of ponds, rather than in streams. The areas where rotenone use is proposed in this project are primarily running water. Also, most amphibian larvae (tadpoles) would have already undergone metamorphosis to the less vulnerable adult stage when the proposed stream treatment would occur.

There are no threatened or endangered species in the area. Some sensitive species that may infrequently use the area and could potentially ingest dead fish, include, bald eagles and wolverines. None of these species would be affected by ingestion of dead fish (see Comment 5c). Management indicator species that may infrequently use the area and could ingest fish, include, black bear, mountain lion, bobcat, and golden eagle. None of these species would be affected by ingestion of dead fish (see comment 5c).

Comment 5g: The fish barrier would likely take between one to two weeks to complete. During construction, noise levels at the immediate barrier area would be elevated and may temporarily dislocate or stress some individual wildlife in the immediate area. In addition, there would be some transfer of equipment, materials and personnel to the barrier construction site. All construction activities would occur during baseflow (mid to late summer) after most breeding and nesting seasons.

Cumulative Impacts: Impacts to fish and wildlife from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would create cumulative impacts to fish and wildlife resources in Elkhorn Creek. If the new barrier and fishery were to attract more recreational use, fish and wildlife resources could potentially suffer from the increased presence of humans. However, based on use patterns of other WCT fisheries, and the fact the Elkhorn Creek already holds hybridized WCT, we would conclude that it is very unlikely that the new WCT fishery would attract significant interest and associated higher use levels. The current fishery would be replaced by a WCT fishery that occupies the same niche and would provide the same ecological functions. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to non-target organisms related to construction of the barrier and treatment of Elkhorn Creek with piscicides.

B.HUMAN ENVIRONMENT

6. NOISE/ELECTRICAL EFFECTS	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Increases in existing noise levels?			X			6a
b. Exposure of people to serve or nuisance noise levels?		X				
c. Creation of electrostatic or electromagnetic effects that could be detrimental to human health or property?		X				
d. Interference with radio or television reception and operation?		X				

Comment 6a: The barrier project site would be less than 50 meters from the road that parallels Elkhorn Creek. During construction (two to six weeks) there would be heavy equipment operating in the immediate area near the proposed barrier. There would also be some movement of equipment, materials, and supplies on unimproved roads on the Beartooth Wildlife Management Area. During piscicide treatment there would be increased use of the roads and trails from the barrier upstream. This would include, increased foot traffic, and very limited use of motorized off road vehicles to ferry equipment for treatment. *During electrofishing treatments there would be increased foot use of the stream corridor for several weeks at a time for several years.*

Cumulative Impacts: Increases in noise from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would create increased noise in the Elkhorn stream corridor. A separate barrier and treatment project was completed in 2010 on Cottonwood Creek - in an adjacent drainage - and approximately 6 road miles from the proposed project. There are no predicted long term cumulative impacts from completion of both projects.

7. LAND USE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of or interference with the productivity or profitability of the existing land use of an area?		X				7a
b. Conflicted with a designated natural area or area of unusual scientific or educational importance?		X				
c. Conflict with any existing land use whose presence would constrain or potentially prohibit the proposed action?			X		Yes	7c
d. Adverse effects on or relocation of residences?		X				

Comment 7a: The proposed action would not precipitate changes in fishing regulations in Elkhorn Creek. Though hybridized, Elkhorn Creek is currently managed as a catch and release fishery for WCT. Restoration to a non-hybridized WCT fishery would not lead to imposition of additional requirements for land users or reduction in the use of Elkhorn Creek for livestock.

Comment 7c: The Elkhorn Creek trailhead and trail are popular with hikers, horsemen, hunters, and anglers. The trailhead is approximately one mile upstream of the proposed barrier construction site. Access to the trail could be limited during construction of the barrier for short periods of time when heavy equipment are accessing the site (infrequently over two to six week's time). Construction activities (excavator operation, dewatering, etc.) would have some impact on recreational aesthetics. If treatment with rotenone is necessary, the trailhead would be closed for several days; with the period of the closure dependent on the amount of time the treated reach remained toxic to fish. The label for CFT Legumine states that detoxification should be terminated when replenished fish survive and show no signs of stress for at least four hours. We would expect the treated water to be non-toxic to fish in 24 to 48 hours after the application of rotenone. Therefore, it can reasonably be expected that the trail closure would last 4 to 7 days total. The Beartooth Wildlife Management Area is a popular and high value hunting area for deer, elk, and sheep. To limit impacts to recreational hunting, every attempt would be made to limit piscicide treatments and construction to periods of non-hunting use. The fish barrier would be constructed during low stream flow periods. Since the barrier site is located next to a vehicle access road, impacts to hunters should be minimal. At proposed treatment levels, stream water would not be toxic to wildlife or livestock. However, to limit any potential conflict, the treatment would be planned when livestock are pastured elsewhere or livestock would be temporarily moved to adjacent pastures during the treatment period. Electrofishing efforts would occur during summer and early fall. Electrofishing efforts would cease prior to the beginning of big game archery season.

Cumulative Impacts: Impacts on land use from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would impact land use in the Elkhorn Creek stream corridor. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts related land use from the proposed construction of the barrier and treatment of Elkhorn Creek with piscicides.

8. <u>RISK/HEALTH HAZARDS</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Risk of an explosion or release of hazardous substances (including, but not limited to oil, pesticides, chemicals, or radiation) in the event of an accident or other forms of disruption?			X		Yes	8a
b. Affect an existing emergency response or emergency evacuation plan or create a			X		Yes	8b

need for a new plan?						
c. Creation of any human health hazard or potential hazard?			X		Yes	see 8a,8c
d. Will any chemical toxicants be used?			X		Yes	see 8a

Comment 8a: The principal risk of human exposure to hazardous materials from this project would be limited to the applicators of the CFT Legumine fish toxicant. All applicators would wear safety equipment required by the product labels and MSDS (Material Safety Data) sheets such as respirator, goggles, rubber boots, Tyvek overalls, and Nitrile gloves. All applicators would be trained on the safe handling and application of the piscicide. Personnel responsible for application of the detoxifying agent (potassium permanganate) would also be trained on its safe handling and application. At least one, and most likely several, Montana Department of Agriculture certified pesticide applicators would supervise and administer the project. Materials would be transported, handled, applied and stored according to the label specifications to reduce the probability of human exposure or spill. During construction of the fish barrier, staging of construction equipment and use of oils and fuels would be regulated to minimize impacts to the landscape and spills. Contractors would obtain a 124 permit (MFWP) prior to construction that would specify steps needed to reduce risks of oil/fuel spills. During construction of the fish barrier, BMP's will be implemented to minimize fuel or oil spills by construction personnel.

Comment 8b: MFWP requires a treatment plan for rotenone projects. This plan addresses many aspects of safety for people who are on the implementation team such as establishing a clear chain of command, training, delegation and assignment of responsibility, clear lines of communication between members, spill contingency plans, first aid, emergency responder information, personal protective equipment, monitoring and quality control, among others. Implementing this project should not have any impact on existing emergency plans. Because an implementation plan has been developed by MFWP the risk of emergency response is minimal and any affects to existing emergency responders would be short term and minor.

Contracting of fish barrier construction would go through the Design and Construction Bureau of MFWP. As such, contractors would follow all requirements (e.g. bonding, insurance) for construction of projects overseen by the State of Montana.

Comment 8c: The EPA (2007) conducted an analysis of the human health risks for rotenone and concluded it has a high acute toxicity for both oral and inhalation routes, but has a low acute toxicity for dermal route of exposure. It is not an eye or skin irritant nor a skin sensitizer. The EPA could not provide a quantitative assessment of potentially critical effects on neurotoxicity risks to rotenone users, so a number of uncertainty factors were assigned to the rating values. They are: an additional 10x database uncertainty factor - in addition to the inter-species (10x) uncertainty factor an intra-species (10x) uncertainty factor – has been applied to protect against potential human health effects and the target margin of exposure (MOE) is 1,000. The following table summarizes the EPA toxicological endpoints of rotenone (from EPA 2007):

Exposure Scenario	Dose Used in Risk Assessment, Uncertainty Factor (UF)	Level of Concern for Risk Assessment	Study and Toxicological Effects
Acute Dietary (females 13-49)	NOAEL = 15 mg/kg/day UF = 1000 aRfD = $\frac{15 \text{ mg/kg/day}}{1000} = 0.015 \text{ mg/kg/day}$	Acute PAD = 0.015 mg/kg/day	Developmental toxicity study in mouse (MRID 00141707, 00145049) LOAEL = 24 mg/kg/day based on increased resorptions
Acute Dietary (all populations)	An appropriate endpoint attributable to a single dose was not identified in the available studies, including the developmental toxicity studies.		
Chronic Dietary (all populations)	NOAEL = 0.375 mg/kg/day UF = 1000 cRfD = $\frac{0.375 \text{ mg/kg/day}}{1000} = 0.0004 \text{ mg/kg/day}$	Chronic PAD = 0.0004 mg/kg/day	Chronic/oncogenicity study in rat (MRID 00156739, 41657101) LOAEL = 1.9 mg/kg/day based on decreased body weight and food consumption in both males and females
Incidental Oral Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day	Residential MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day [M/F] based on decreased parental (male and female) body weight and body weight gain
Dermal Short-, Intermediate-, and Long-Term	NOAEL = 0.5 mg/kg/day 10% dermal absorption factor	Residential MOE = 1000 Worker MOE = 1000	Reproductive toxicity study in rat (MRID 00141408) LOAEL = 2.4/3.0 mg/kg/day
Inhalation Short-term (1-30 days) Intermediate-term (1-6 months)	NOAEL = 0.5 mg/kg/day 100% inhalation absorption factor	Residential MOE = 1000 Worker MOE = 1000	[M/F] based on decreased parental (male and female) body weight and body weight gain
Cancer (oral, dermal, inhalation)	Classification; No evidence of carcinogenicity		

UF = uncertainty factor, NOAEL = no observed adverse effect level, LOAEL = lowest observed adverse effect level, aPAD = acute population adjusted dose, cPAD = chronic population adjusted does, RfD = reference dose, MOE = margin of exposure, NA = Not Applicable

Rotenolenoids are common degradation products found in the parent plant material used to make piscicidal forms of rotenone. The EPA (2007) concluded these degradation products are no more toxic than the active ingredient.

The EPA analysis of acute dietary risk for both food and drinking water concluded;

When rotenone is used in fish management applications, food exposure may occur when individuals catch and eat fish that either survived the treatment or were added to the water body (restocked) prior to complete degradation. Although exposure from this route is unlikely for the general U.S. population, some people might consume fish following a rotenone application. EPA used maximum residue values from a bioaccumulation study to estimate acute risk from consuming fish from treated water bodies. This estimate is considered conservative because the bioaccumulation study measured total residues in edible portions of fish including certain non-edible portions (skin, scales, and fins) where concentrations may be higher than edible portions (tissue) and the Agency assumed that 100% of fish consumption could come from rotenone exposed fish. In addition, fish are able to detect rotenone's presence in water and, when possible, attempt to avoid the chemical by moving from the treatment area. Thus, for partial kill uses, surviving fish are likely those that have intentionally minimized exposure.

Acute exposure estimates for drinking water considered surface water only because rotenone is only applied directly to surface water and is not expected to reach groundwater. The estimated drinking water concentration (EDWC) used in dietary exposure estimates was 200 ppb, the solubility limit of rotenone. The drinking water risk assessment is conservative because it assumes water is consumed immediately after treatment with no degradation and no water treatment prior to consumption.

Acute dietary exposure estimates result in dietary risk below the Agency's level of concern. Generally, EPA is concerned when risk estimates exceed 100% of the acute population adjusted dose (aPAD). The exposure for the "females 13-49 years old" subgroup (0.1117 mg/kg/day) utilized 74% of the aPAD (0.015 mg/kg/day) at the 95th percentile (see Table). It is appropriate to consider the 95th percentile because the analysis is deterministic and unrefined. Measures implemented as a result of this RED will further minimize potential dietary exposure (see Section IV).

As for evaluating the human chronic risk from exposure to rotenone treated water, the EPA acknowledges the four principle reasons for concluding there is a low risk. First, the rapid natural degradation of rotenone. Second, using active detoxification measures by applicators such as potassium permanganate. Next, properly following piscicide labels which prohibit the use near water intakes. Finally, proper signing, public notification or area closures which limit public exposure to rotenone treated water.

As for recreational exposure, the EPA concludes no risk to adults who enter treated water following the application from dermal and incidental ingestion, but requires a waiting period of 3 days after a treatment before toddlers swim in treated water. The aggregate risk to human health from food, water and swimming does not exceed the EPA level of concern (EPA 2007). Recreationists in the area would likely not be exposed to the treatments because a temporary closure would preclude many from being in the area. Proper warning through news releases, signing the project area, road closure and administrative personnel in the project area should be adequate to keep unintended recreationists from being exposed to any treated waters.

Fisher (2007) conducted an analysis of the inert constituent ingredients found in the rotenone formulation of CFT Legumine for the California Department of Fish and Game. These inert ingredients are principally found in the emulsifying agent Fennodefo⁹⁹ which helps make the generally insoluble rotenone more soluble in water. The constituents were considered because of their known hazard status and not because of their concentrations in the CFT Legumine formulation. Solvents such as xylene, trichloroethylene (TCE) and tetrachloroethylene are residue left over from the process of extracting rotenone from the root and can be found in some lots of CFT Legumine. However, inconsistent detectability and low occurrence in other formulations that used the same extraction process were below the levels for human health and ecological risk. Solvents such as toluene, *n*-butylbenzene, 1,2,4 trimethylbenzene and naphthalene are present in CFT Legumine, and when used in other applications can be an inhalation risk. However, because of their low concentrations in this formulation, the human health risk is low. The remaining constituents, the fatty acid esters, resin acids, glycols, substituted benzenes, and *I*-hexanol were likewise present but either, analyzed, calculated or estimated to be below the human health risk levels when used in a typical fish eradication project.

Methyl pyrrolidone is also found in CFT Legumine. It is known to have good solvency properties and is used to dissolve a wide range of compounds including resins (rotenone). Analysis of methyl pyrrolidone in CFT Legumine showed it represents about 9% of the formulation (Fisher 2007). The analysis by Fisher (2007) concluded the following regarding the constituent ingredients in CFT Legumine:

...None of the constituents identified are considered persistent in the environment nor will they bioaccumulate. The trace benzenes identified in the solvent mixture of CFT Legumine™ will exhibit limited volatility and will rapidly degrade through photolytic and biological degradation mechanisms. The PEGs are highly soluble, have very low volatility, and are rapidly biodegraded within a matter of days. The fatty acids in the fatty acid ester mixture (Fennodefo99™) do not exhibit significant volatility, are virtually insoluble, and are readily biodegraded, although likely over a slightly longer period of time than the PEGs in the mixture. None of the new compounds identified exhibit persistence or are known to bioaccumulate. Under conditions that would favor groundwater exchange the highly soluble PEGs could feasibly transmit to groundwater, but the concentrations in the reservoir, and the rapid biodegradation of these constituents makes this scenario extremely unlikely. Based upon a review of the physical chemistry of the chemicals identified, we conclude that they are rapidly biodegraded, hydrolyzed and/or otherwise photolytically oxidized and that the chemicals pose no additional risk to human health or ecological receptors from those identified in the earlier analysis. None of the constituents identified appear to be at concentrations that suggest human health risks through water, or ingestion exposure scenarios and no relevant regulatory criteria are exceeded in estimated exposure concentrations...

The CFT Legumine MSDS states “...when working with an undiluted product in a confined space, use a non-powered air purifying respirator...and... air-purifying respirators do not protect workers in oxygen-deficient atmospheres...” It is not likely that workers would be handling CFT

Legumine in an oxygen deficient space during normal use. However, to guard against this, proper ventilation and safety equipment would be used according to the label requirements.

The advantage of CFT Legumine over Prenfish is that it has less petroleum hydrocarbon solvents such as toluene, xylene, benzene and naphthalene. By comparison, Prenfish has a strong chemical odor. CFT Legumine is virtually odor-free and performs almost identically to Prenfish.

In their description of how South American Indians prepare and apply *Timbó*, a rotenone parent plant, Teixeira et al. (1984) reported that the Indians extensively handled the plants during a mastication process, and then swam in lagoons to distribute the plant pulp. No harmful effects were reported. It is important to note that the primitive method of applying rotenone from root does not involve a calculated target concentration, metering devices, or involve human health risk precautions as those involved with fisheries management programs.

Contracting of fish barrier construction would go through the Design and Construction Bureau of MFWP. As such, contractors would follow all requirements (e.g. bonding, insurance) for construction of projects overseen by the State of Montana.

Electrofishing would be completed by trained MFWP personnel and would pose no human health hazards.

Cumulative Impacts: Health hazards from the proposed action and the connected action of barrier construction would be short term and mitigated through use of proper safety equipment, etc. We do not expect the proposed action to result in other actions that would increase the risk of health hazards in the Elkhorn Creek stream corridor. We do not foresee any other activities in the basin that would add to health impacts of the proposed action. As such there are no cumulative impacts related health hazards from the proposed construction of the barrier and treatment of Elkhorn Creek with piscicides.

9. <u>COMMUNITY IMPACT</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of the location, distribution, density, or growth rate of the human population of an area?		X				
b. Alteration of the social structure of a community?		X				
c. Alteration of the level or distribution of employment or community or personal income?		X				
d. Changes in industrial or commercial activity?		X				
e. Increased traffic hazards or effects on existing transportation facilities or patterns of movement of people and goods?		X				

10. <u>PUBLIC SERVICES/TAXES/UTILITIES</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Will the proposed action have an effect upon or result in a need for new or altered governmental services in any of the following areas: fire or police protection, schools, parks/recreational facilities, roads or other public maintenance, water supply, sewer or septic systems, solid waste disposal, health, or other governmental services? If any, specify:		X				
b. Will the proposed action have an effect upon the local or state tax base and revenues?		X				
c. Will the proposed action result in a need for new facilities or substantial alterations of any of the following utilities: electric power, natural gas, other fuel supply or distribution systems, or communications?		X				
d. Will the proposed action result in increased used of any energy source?		X				
e. Define projected revenue sources		X				
f. Define projected maintenance costs		X				

11. <u>AESTHETICS/RECREATION</u>	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Alteration of any scenic vista or creation of an aesthetically offensive site or effect that is open to public view?		X				
b. Alteration of the aesthetic character of a community or neighborhood?		X				
c. Alteration of the quality or quantity of recreational/tourism opportunities and settings? (Attach Tourism Report)			X		Yes	See 11c
d. Will any designated or proposed wild or scenic rivers, trails or wilderness areas be impacted? (Also see 11a, 11c)		X				

Comment 11c: There would be a temporary loss of angling opportunity in upper Elkhorn Creek between the time of fish removal and for several years after fish removal. Elkhorn Creek upstream of the proposed fish barrier should be fully colonized with WCT within 5 years of project implementation. In most cases cutthroat trout fisheries in streams in Montana are catch and release only. If WCT numbers reach harvestable levels, limited angler harvest would be considered in Elkhorn Creek above and below the fish barrier

Cumulative Impacts: Impacts to recreation and aesthetics from the proposed action and the connected action of barrier construction would be short term and minor. We do not expect the proposed action to result in other actions that would impact recreation/aesthetics in the Elkhorn Creek stream corridor. We do not foresee any other activities in the basin that would add to impacts of the proposed action. As such there are no cumulative impacts to recreation/aesthetics from the proposed construction of the barrier and treatment of Elkhorn Creek with piscicides.

12. CULTURAL/HISTORICAL RESOURCES	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action result in:						
a. Destruction or alteration of any site, structure or object of prehistoric, historic, or paleontological importance?		X				12a
b. Physical change that would affect unique cultural values?		X				
c. Effects on existing religious or sacred uses of a site or area?		X				12c
d. Will the project affect historic or cultural resources?		X				

Comment 12a: A cultural/historical survey including consideration of archaeological resources and Native American culture would be completed at the project site prior to construction. The proposed action of piscicide treatment would have no impact on any potential cultural sites in the Elkhorn Creek basin.

Comment 12c: The project site is located within the aboriginal range of several Native American tribes. Cultural officers for tribes which would have interest in this project would be consulted prior to any decision making process.

13. SUMMARY EVALUATION OF SIGNIFICANCE	IMPACT Unknown	None	Minor	Potentially Significant	Can Impact Be Mitigated	Comment Index
Will the proposed action, considered as a whole:						
a. Have impacts that are individually limited, but cumulatively considerable?		X				
b. Involve potential risks or adverse		X				

effects which are uncertain but extremely hazardous if they were to occur?						
c. Potentially conflict with the substantive requirements of any local, state, or federal law, regulation, standard or formal plan?		X				
d. Establish a precedent or likelihood that future actions with significant environmental impacts will be proposed?		X				13d
e. Generate substantial debate or controversy about the nature of the impacts that would be created?	X				Yes	13e
f. Is the project expected to have organized opposition or generate substantial public controversy? (Also see 13e)	X					13f
g. List any federal or state permits required.						13g

Comment 13d: This project does not establish a precedent or likelihood that additional projects with significant environmental impacts would be proposed. An ongoing WCT restoration project (2002 to 2010) in Cottonwood Creek, the next drainage to the north is complete. A barrier on Cottonwood Creek has been constructed, non-native fishes have been removed, and non-hybridized WCT have been transferred to fishless habitat upstream of the constructed fish barrier. No other WCT restoration projects are planned for the Beartooth Wildlife Management Area. The success or failure of the Cottonwood Creek project or any other WCT restoration project would have no impact on the success or failure of the proposed action.

Comments 13e and f: The use of pesticides can generate controversy from some people. Public outreach and information programs can educate the public on the use of pesticides. It is not known if this project would have organized opposition. If project goals were completed solely with electrofishing techniques; the potential for debate and controversy would be lessened considerably.

Comment 13g: The following permits would be required for the piscicide treatment and the proposed fish barrier:

DEQ 308 - Department of Environmental Quality (authorization for short term exemption of surface water quality standards for the purpose of applying a fish toxicant).

In addition, the following permits would be necessary prior to construction of the fish barrier:
 SPA 124 Permit - Montana Stream Protection Act,
 318 Authorization - Short-Term Water Quality Standard for Turbidity,
 404 Permit - Federal Clean Water Act.

PART III. ALTERNATIVES

Alternative 1 – No Action

The no action alternative would allow status quo management to continue which would maintain the present angling quality and species diversity in Elkhorn Creek. Elkhorn Creek would likely continue to become more and more hybridized with rainbow trout passing the old gabion barrier. In addition, brook trout would continue to pass the barrier. If brook trout continue to colonize upper Elkhorn Creek, complete displacement of the current hybrid fishery is a possibility. Any potential local genetic adaptations of WCT in the headwaters of Elkhorn Creek would be lost due to continued hybridization.

Alternative 2 – Barrier construction and non-native fish removals (electrofishing or piscicide treatment)

The proposed action includes construction of a fish barrier and removal of existing non-native WCT in Elkhorn Creek.

The predicted benefits of Alternative 2 include:

- Protection/restoration of non-hybridized WCT in Elkhorn Creek (7 to 9 miles of inhabited stream)
- Reduction in the risk of potential listing under the Endangered Species Act.
- This project would also provide a unique opportunity for anglers to fish for Montana's native trout in an accessible area of the Beartooth Wildlife Management Area.

Alternative 3 – Mechanical removal only

Under this alternative electrofishing would be the sole technique considered for non-native fish removals. Under this alternative, if brook trout have penetrated into the headwaters, electrofishing would likely be inadequate to remove all brook trout. In addition, if electrofishing proves to be inefficient because of complex habitats, then the goal of a population of slightly hybridized (< 1%) WCT would not be met. Electrofishing has been used to remove unwanted fish from streams with some success in northcentral Montana (Big Coulee Creek, Middle Fork Little Belt Creek, and Cottonwood Creek; Moser 2008). Streams in which brook trout have been selectively removed to protect non-hybridized WCT have been shorter in length and much less complex than Elkhorn Creek. In general these efforts have been limited to simple 1st to 2nd order streams where brook trout are out-competing non-hybridized WCT. Since using electrofishing as the sole restoration tool may not suffice in meeting project requirements, this alternative was removed from consideration.

Prepared by: David Moser

Date: 3/22/2011

Submit written comments to: Montana Fish, Wildlife & Parks
c/o Elkhorn Creek EA Comments
4600 Giant Springs Rd.
Great Falls, MT 59405

Comment period is 30 days. Comments must be received by 4/22/2011

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